ORDER NO. GAD85015403S1
A1

Service Manual

Supplement-1

Microcassette

RN-109

(Silver)

2-Speed Microcassette Recorder with Voice Activated System

- Please use this manual together with the service manual for model No. RN-109 order No. GAD84035403C1.
- This Service Manual indicates the main differences between; Original RN-109 and RN-109 (Supplement-1).

This is the Service Manual for the following areas.

M ···For U.S.A.

C ···For Canada.

— CHANGE —

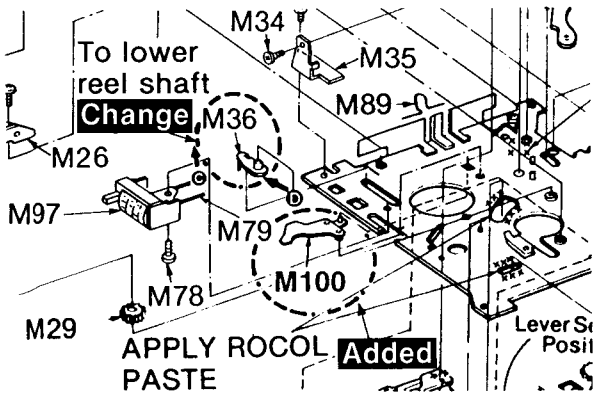
PARTS COMPARISON TABLE:

Please revise the original parts list in the Service Manual (RN-109) to conform to the changes shown herein.
If new part numbers are shown, be sure to use them when ordering parts.

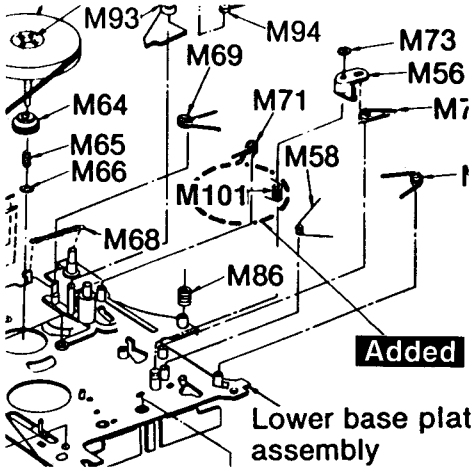
Ref. No.	Part Name & Description	Part Numbers		Remarks
		RN-109 (Original)	**RN-109 (Supplement-1)**	
D2	Diode	1SR35200	—	Deleted
M17	Spacer	XTW1380	—	Deleted
M36	Switch Lever-A	QMF2143	**QMF2354**	Change
M100	Playback Lever	—	**QML4182**	Added
M101	Switch Lever Spring	—	**QBN2098**	Added

MECHANISM PARTS LOCATION

Front View



Rear View



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GAD
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Printed in Japan (H)

ORDER NO. GAD85025500A1
A1

Service Manual

Microcassette

RN-109A

(Silver)

2-Speed Microcassette Recorder
wite Voice Activated System

- RN-109A is similar model to RN-109.
- Please use this manual together with the service manual for model No. RN-109 (Original) order No. GAD84035403C1 and model No. RN-109 (Supplement-1) order No. GAD85015403S1.
- This sevice manual indicates the main differences between; Original RN-109 and RN-109A.

This is the Service Manual for the following areas.

[M] ···For U.S.A.

[C] ···For Canada.

PARTS COMPARISON TABLE:

Please revise the original parts list in the Service Manual RN-109[P][C] to conform to the changes shown herein.
If new part numbers are shown, be sure to use them when ordering parts.

Ref. No.	Part Name & Description	Part Number		Remarks
		RN-109[P][C] (Original)	**RN-109A[M][C]**	
C5, 8, 11	Capacitors	QCUX1E154ZFX	**ECUX1E104ZF**	**25V, 0.1μF**
M30	Takeup Reel Table Assembly	QXD0151	**RFJ47Z**	
K1	Main Case Assembly	QYM0952S	**QKM1609S**	
K2	Bottom Case	QKM1610S	**QKM1610H**	
K3	Battery Cover	QKF4040S2	**QKF4040H4**	
K7	Main Name Plate	QGS3168	**RGT1138Z**	
K8	Screw ⊕1.6×3	XTNQ16C3MFC	**XTNQ16C3MFN**	
K9	Tapping Screw ⊕2×16	XTN2+16JFC	**XTN2+16JFN**	
A1 [M] (For U.S.A.)	Instruction Book	QQT3620	**RQX4577Z**	
A1 [C] (For Canada.)	Instruction Book	QQT3674	**RQX4578Z**	
P1 [M] (For U.S.A.)	Inside Carton	QPN4585	**RPK1999Z**	
P1 [C] (For Canada.)	Inside Carton	QPN4605	**RPK2000Z**	
P3	Label	QQC1844	**RQA451Z**	

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GAD
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ORDER NO. GAD84035403C1

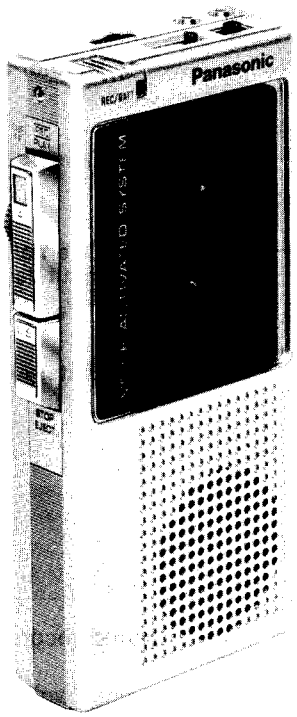
Service Manual

Microcassette

RN-109

(Silver)

2-Speed Microcassette Recorder
with Voice Activated System



This is the Service Manual for the following areas.

P ...For U.S.A.

C ...For Canada.

RN-006 MECHANISM SERIES

■ SPECIFICATIONS

Power Requirement:	AC; 120V, 60Hz (with optional Panasonic AC Adaptor RP-34) Battery; 3V (two "AA" size dry batteries) Car Battery; with optional Panasonic Car Adaptor RP-993
Motor:	Electrical governor motor
Program Time:	2 hours with RT-60MC microcassette tape (at LP speed) 1 hour with RT-60MC microcassette tape (at SP speed)
Track System:	2 Track monaural recording and Playback
Tape Speed:	SP; 2.4cm/s (15/16 ips) LP; 1.2cm/s (15/32 ips)
Fast Forward and Rewind Time:	Approx. 120 seconds with RT-60MC microcassette tape
Inputs:	Mic; sensitivity 0.25mV/applicable microphone impedance 200Ω~600Ω DC-in; 3V
Output:	Monitor; 8Ω
Speaker:	3.6cm PM (1-3/8") dynamic speaker
Dimensions:	60.8mm(W)×127mm(H)×24.5mm(D) [2-3/8"(W)×5"(H)×1"(D)]
Weight:	180g (7 oz) without batteries

Weights and dimensions shown are approximate.
(Les poids et dimensions mentionnes sont approximatifs.)
Design and specifications are subject to change without notice.

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LOCATION OF CONTROLS AND COMPONENTS

CONTROLS

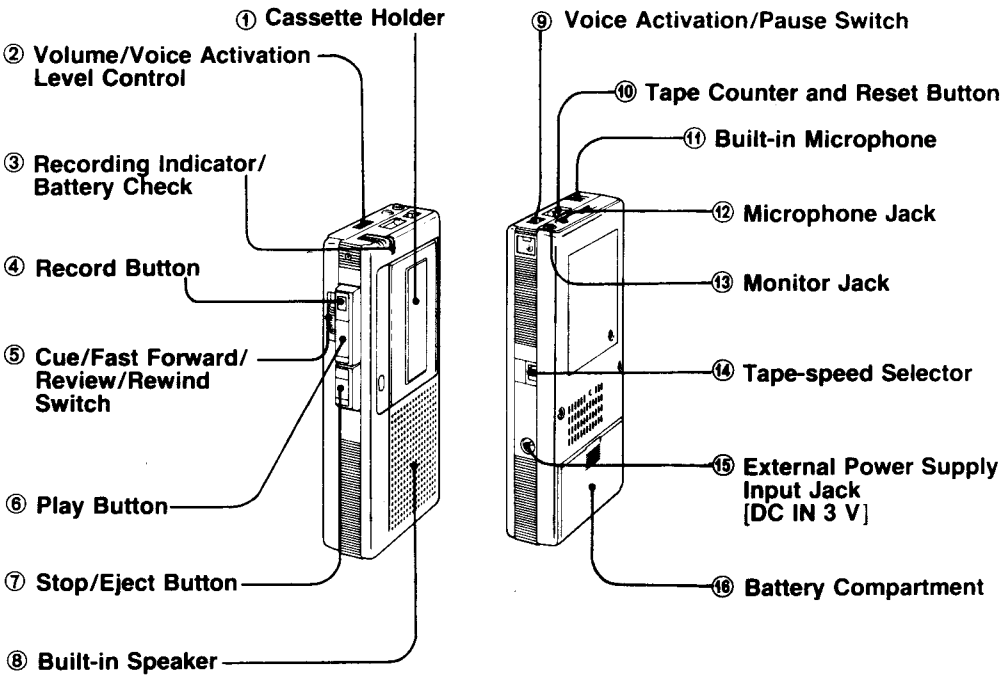

① Cassette Holder
② Volume/Voice Activation Level Control
③ Recording Indicator/ Battery Check
④ Record Button
⑤ Cue/Fast Forward/ Review/Rewind Switch
⑥ Play Button
⑦ Stop/Eject Button
⑧ Built-in Speaker
⑨ Voice Activation/Pause Switch
⑩ Tape Counter and Reset Button
⑪ Built-in Microphone
⑫ Microphone Jack
⑬ Monitor Jack
⑭ Tape-speed Selector
⑮ External Power Supply Input Jack [DC IN 3 V]
⑯ Battery Compartment

Fig. 1

■ VOICE ACTIVATED RECORDING

What is voice activated recording?

When conferences or conversation is recorded using the voice-activated recording function, only the sound is recorded automatically so there is no tape waste.
When the Voice Activation Switch is set to "ON", the tape runs when voice is picked up by the microphone (Built-in Microphone, External Microphone) and when no voice is picked up, the tape stops running automatically about 4 seconds later.

Note:

- The recording level is automatically adjusted regardless of the position of the Volume/Voice Activated Level Control.

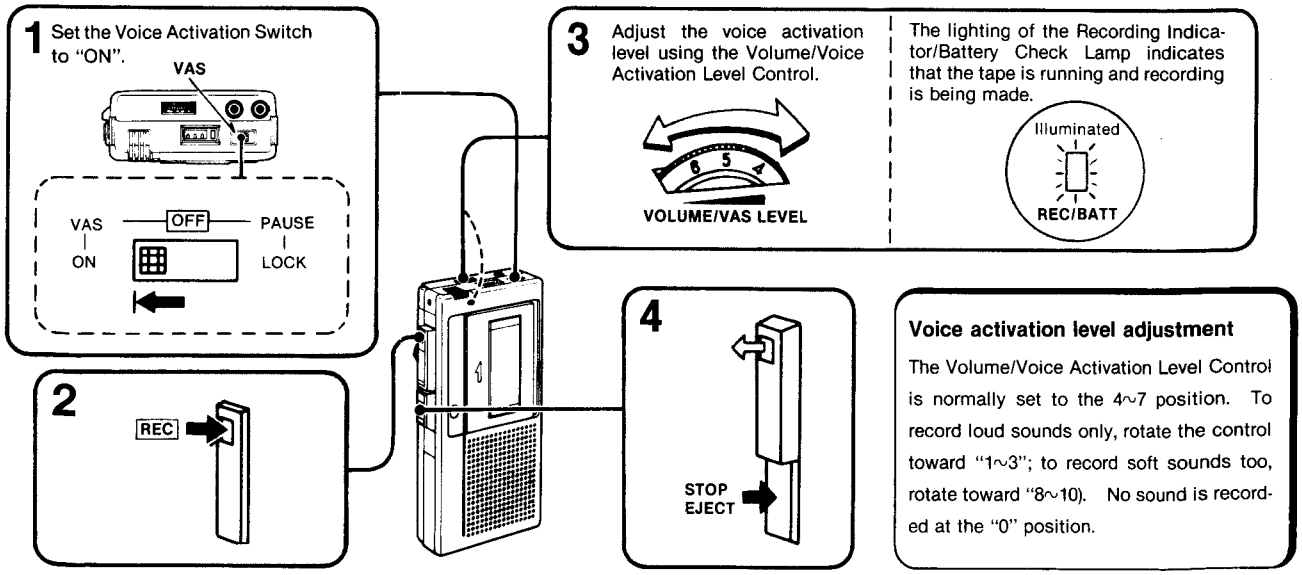

1 Set the Voice Activation Switch to "ON".
VAS
VAS
OFF
PAUSE
ON
LOCK
2
REC
3 Adjust the voice activation level using the Volume/Voice Activation Level Control.
VOLUME/VAS LEVEL
The lighting of the Recording Indicator/Battery Check Lamp indicates that the tape is running and recording is being made.
Illuminated
REC/BATT
4
STOP
EJECT
Voice activation level adjustment
The Volume/Voice Activation Level Control is normally set to the 4~7 position. To record loud sounds only, rotate the control toward "1~3"; to record soft sounds too, rotate toward "8~10). No sound is recorded at the "0" position.

Fig. 2

DISASSEMBLY INSTRUCTIONS

Notes:

1. Because this unit is very small, and therefore the screws are also especially small, be careful not to lose any parts during disassembly.
2. Be very careful, when replacing parts or checking, not to damage the lead wiring, because it is much thiner than lead wiring used in other sets.

A. How to remove the cassette lid assembly (M84).

- As shown in fig. 3, push the claw in the direction of arrow ① , then pull cassette lid assembly in the direction of arrow ② .
  Then, it can be removed.

B. How to remove main case assembly (K1).

1. Remove two screws-A (1.6×4). (Fig. 3)
2. As shown in fig. 3, push the main case assembly in the direction of arrow ④ while pulling portion (B) in the direction of arrow ③ .
   Then, the main case assembly can be removed.

C. How to remove the bottom case (K2).

1. Remove two screws-C (2×1.6) and one screw-D (1.6×4). (Fig. 4)
2. Desolder the point (E) joining the battery terminal and the FPC board.
   The bottom case assembly can be, then, removed as shown in fig. 6.

NOTE:

Be careful not to lose the shelter (K19) since it is easy to come off as shown in fig. 7.

D. How to remove FPC board

- Remove one screw-F (1.6×2.2), one screw-G (1.6×3) and one screw-H (1.6×1.5). (Fig. 7)

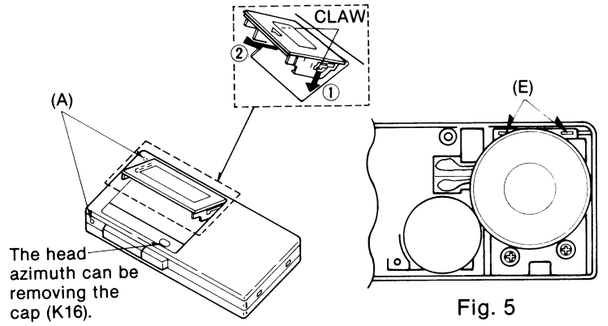


Fig. 3

Fig. 5

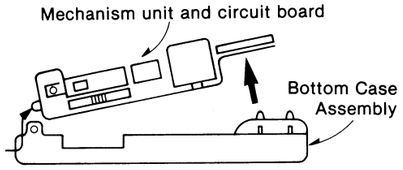


Fig. 6

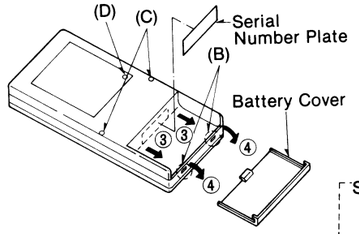


Fig. 4

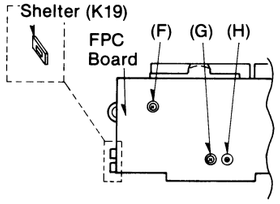


Fig. 7

REPLACING THE MAIN PARTS OF THE MECHANISM UNIT

- To remove the mechanism unit, see the section "DISASSEMBLY INSTRUCTION".

A. How to replace the motor assembly

1. Remove two screws (A) to remove the motor assembly. (See fig. 8.)
2. Mount the motor assembly so that its lead wires direct as shown in fig. 8.

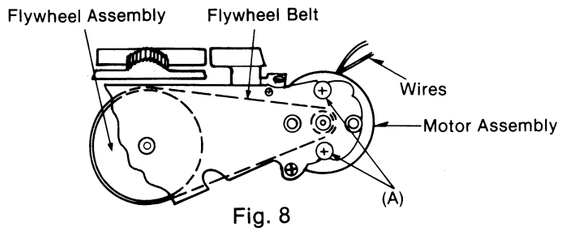


Fig. 8

B. How to replace record/playback head

1. Remove the pinch roller spring as shown in fig. 9.
2. Remove the poly washer (B) to remove the pinch roller arm assembly. (See fig. 9.)
3. Remove two screws (C) to remove the record/playback head. (See fig. 9.)
4. When the record/playback head is installed, reverse the disassembly procedure above.
5. Readjust the head, referring to measurement and adjustment in this service manual.

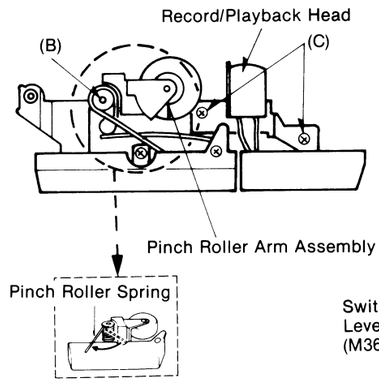


Fig. 9

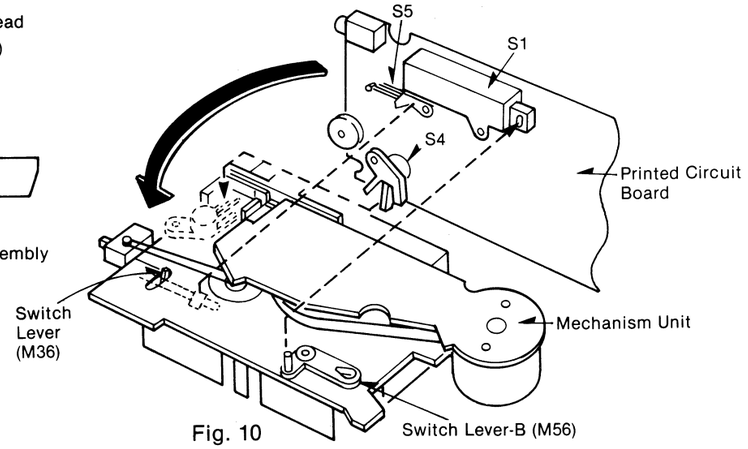


Fig. 10

Assembly notes:

- When installing the printed circuit board on the mechanism unit, note the following:
  Check that the reocrd/playback (S1), play (S5) and fast forward/rewind (S4) switches are placed in their specified positions as shown in fig. 10.

MEASUREMENT AND ADJUSTMENT METHODS

NOTES: Keep good condition, set switch buttons and controls in the following positions, unless otherwise specified.

- Make sure heads are clean.
- Make sure capstan and pinch roller are clean.
- Judgeable room temperature: 20±5°C (68±9°F)
- Volume control: Maximum
- Tape speed select switch: 2.4cm/s
- FF/REW switch: OFF
- VAS/Pause switch: OFF

ITEM	MEASUREMENT & ADJUSTMENT
Adjusting the governor circuit (μ adjustment)	**Note:** This unit is designed to supply the motor and motor governor circuit board together, thus requiring no governor circuit adjustment when the motor is replaced. However, the R103 adjusting resistor in the motor governor circuit uses 10kΩ to 20kΩ depending on the product. When replacing the resistance of R103, be sure to use a resistance of the same value.
Ⓐ **Tape speed adjustment** Condition: * Playback mode Equipment: * DC power supply * Digital electronic counter * Test tape ...QZZMWA for 2.4cm/s ...QZZMWBL for 1.2cm/s	1. Test equipment connection is shown in fig. 11. 2. Apply 3V to DC IN. 3. Connect the monitor output (8Ω) to the counter. 4. Playback the tape speed adjusting tape (for 2.4cm/s 3kHz, QZZMWA, for 1.2cm/s QZZMWBL). 5. Measure this frequency. **Standard value: 3000±90Hz (2.4cm/s), 3000 $^{+90}_{-150}$ Hz (1.2cm/s)** 6. If measured value is not within standard, adjust as follows. **A) 1.2cm/s adjustment** 1. Set the tape speed selector switch (S2) to 1.2cm/s. 2. Adjust tape speed adjustment VR101 (for 1.2cm/s adjustment) so that frequency is 3000 $^{+90}_{-150}$ Hz. **B) 2.4cm/s adjustment** 1. Set the tape speed selector switch (S2) to 2.4cm/s. 2. Measure in the same way as 1.2cm/s and adjust tape speed adjustment VR102 (for 2.4cm/s adjustment) so that frequency is 3000±90Hz.

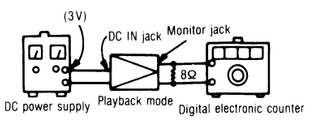
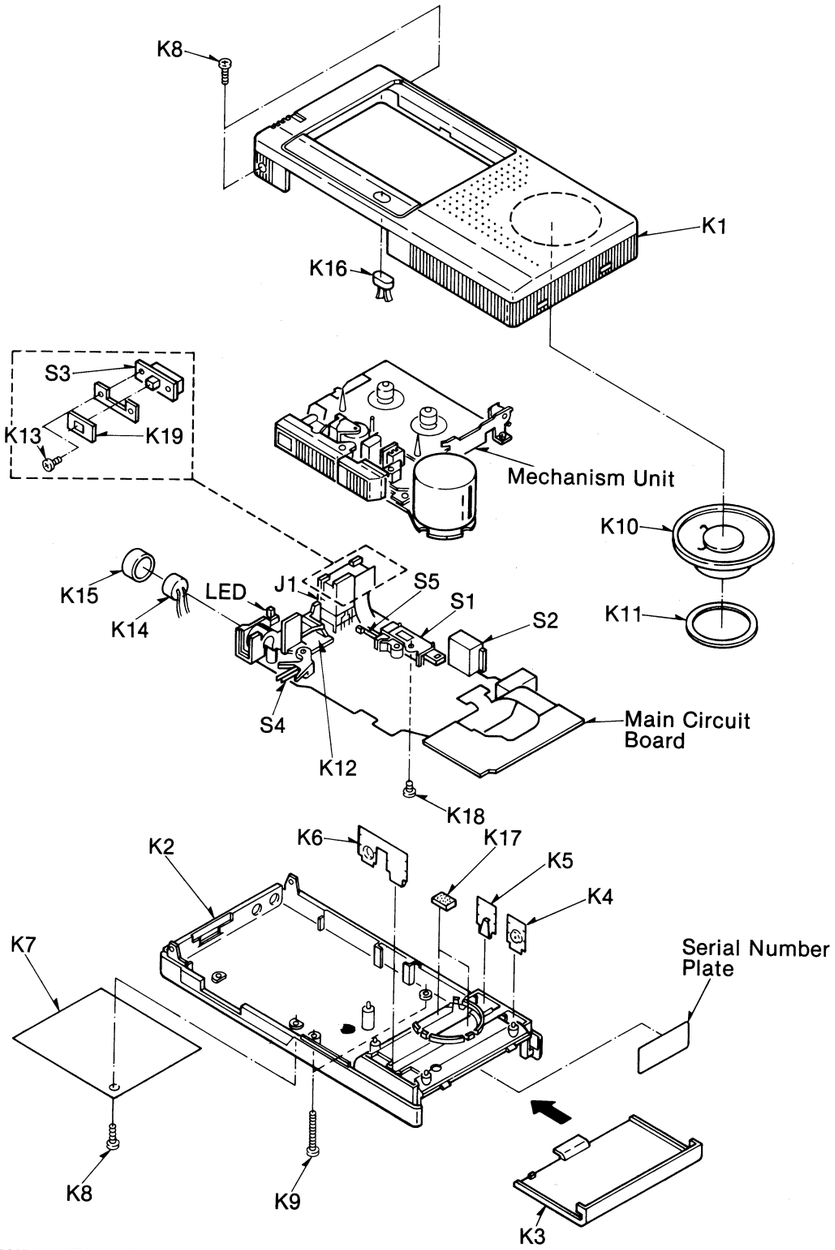


Fig. 11

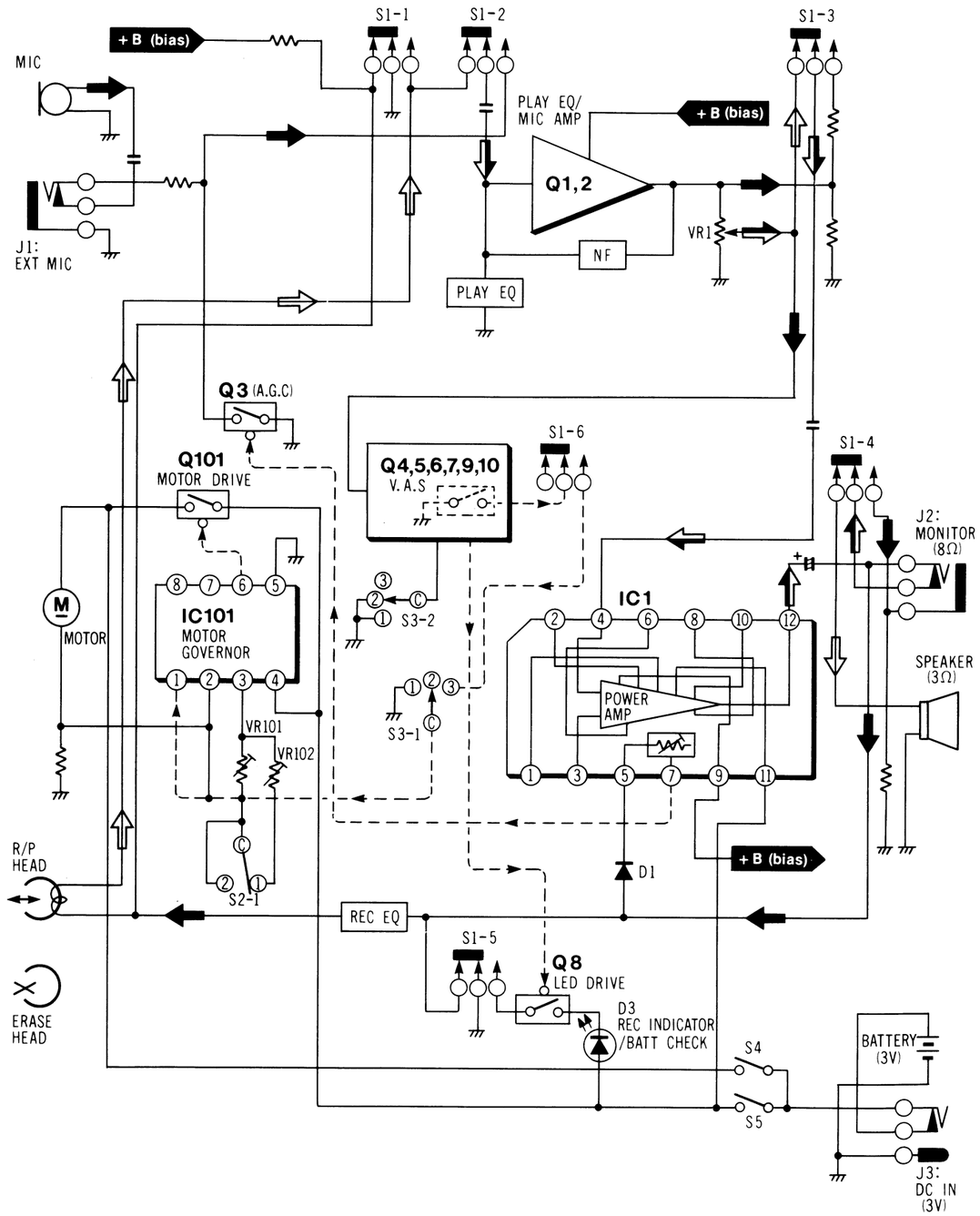
CABINET PARTS LOCATION



REPLACEMENT PARTS LIST

Ref. No.	Part No.	Part Name & Description
		CABINET PARTS
K 1	QYM0952S	Main Case Assembly
K 2	QKM1610S	Bottom Case
K 3	QKF4040S2	Battery Cover
K 4	QJB0162	Battery Terminal-A
K 5	QJB0163	Battery Terminal-B
K 6	QJB0164	Battery Terminal-C
K 7	QGS3168	Main Name Plate
K 8	XTNQ16C3MFC	Screw ⊕1.6×3
K 9	XTN2+16JFC	Tapping Screw ⊕2×16
K 10	EAS3P108S	Speaker
K 11	QBM1307	Speaker Cushion
K 12	QKJ0526	Switch Holder
K 13	XQN16+A3	Screw ⊕1.6×3
K 14	WM063Y110	Condenser Microphone
K 15	QBG1641	MIC Cushion
K 16	QKJ0411H1	Azimuth Cap
K 17	QBH0177	Felt
K 18	XTNQ16A15F	Screw ⊕1.6×1.5
K 19	QQC1735	Shelter (for S3)
		ACCESSORY
A 1	[P] QQT3620	Instruction Book
	[For U.S.A.]	
	[C] QQT3674	Instruction Book
	[For Canada.]	
		PACKINGS
P 1	[P] QPN4585	Inside Carton
	[For U.S.A.]	
	[C] QPN4605	Inside Carton
	[For Canada.]	
P 2	QPA0661	Spacer
P 3	QQC1844	Label

BLOCK DIAGRAM

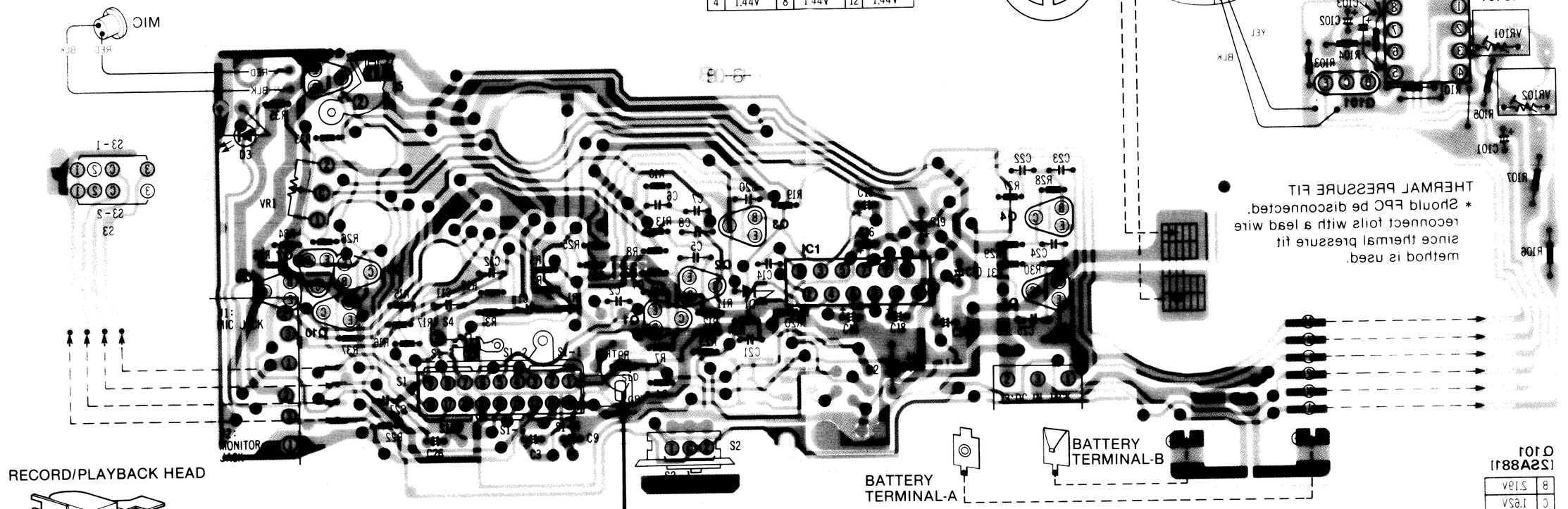


NOTES:

- S1-1—S1-6 .....Record/Playback switch (shown in playback position).
- S2-1 .....Tape speed selector (shown in 2.4cm/s position). [1...2.4cm/s, 2...1.2cm/s]
- S3-1, S3-2.....Pause/VAS ON/OFF switch (shown in OFF position). [1...Pause, 2...OFF, 3...VAS]
- S4.....Fast forward/Rewind switch (shown in OFF position).
- S5.....Playback switch (shown in OFF position).
- VR1 .....Volume control.
- VR101 .....Tape speed adjustment VR (for 1.2cm/s).
- VR102 .....Tape speed adjustment VR (for 2.4cm/s).
- ( ) .....This symbol indicates the NPN switching transistor.
- ( ) this arrow indicates the flow of the recording signal.
- ( ) this arrow indicates the flow of the playback signal.
- ( ) this arrow indicates the flow of the recording signal and playback signal combination.
- ( ) this arrow indicates the flow of the control signal.

CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM

Back Side View



IC1 (BA515M)

1	1.51V	5	0V	9	2.82V
2	0.71V	6	0V	10	2.76V
3	1.46V	7	0.18V	11	2.97V
4	1.44V	8	1.44V	12	1.44V

Q1 (2SC2412)

B	0.58V
C	0.66V
E	0.004V

Q2 (2SC2412)

B	0.60V
C	0.87V
E	0.18V

Q3 (2SC2412)

B	0.18V
C	0V
E	0V

Q4 (2SC2412)

B	0.60V
C	0.74V
E	0V

Q5 (2SC2412)

B	0.67V
C	0.82V
E	0.07V

Q6 (2SC2412)

B	0.16V
C	0V
E	0V

Q7 (2SC2412)

B	0V
C	0.82V
E	——

Q8 (DTC143T)

B	0.82V
C	1.70V
E	0.46V

Q9 (2SC2412)

B	0.82V
C	0.17V
E	0.16V

Q10 (2SC2412)

B	0.17V
C	0.01V
E	0V

Q101 (2SA881)

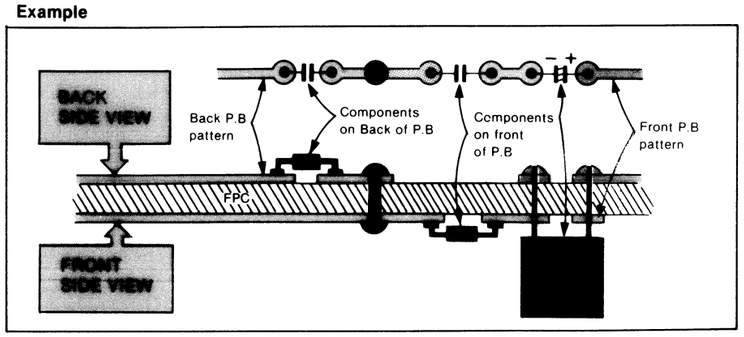
B	2.19V
C	1.62V
E	2.90V

IC101 (AN6616)

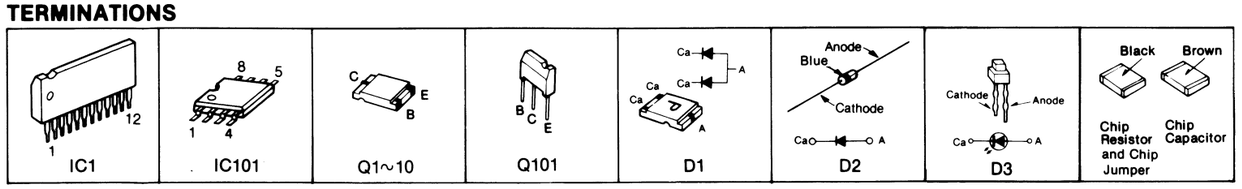
1	0.40V	5	0V
2	0.15V	6	2.20V
3	1.15V	7	1.65V
4	2.90V	8	0.48V

NOTES:
BLK .....Black
BLU .....Blue
BRN.....Brown
GRY.....Gray
GRN ...Green
L. BLU ...Light Blue
NIL .....No Color Mark
ORG ...Orange
PNK.....Pink
RED.....Red
SLD .....Shield Wire
VLT .....Violet
WHT.....White
YEL .....Yellow

Example



TERMINATIONS



NOTES:
- The circuit shown in ~~~~ on the conductor indicates printed circuit on the back side of the printed circuit board.
- The circuit shown in ~~~~ on the conductor indicates printed circuit on the front side of the circuit board, which is put the mechanism unit.
- Components on back of P.B are identified by black symbols.
- Components on front of P.B are identified by blue symbols.
- The symbols (●) shown in the circuit board indicate connection points between conductors on the front side and back side of the circuit board.
- Voltage values shown in [ ] are measured values at the front pattern side of the printed circuit board.
- Voltage values shown in [ ] are measured values at the back pattern side of the printed circuit board.
- Values indicates in [ ] [ ] are DC voltage between the chassis and electrical parts.
- All voltage values shown in circuitry are under no signal condition. Unless otherwise specified, voltage measurement conditions are that tape travel is at PLAYBACK.

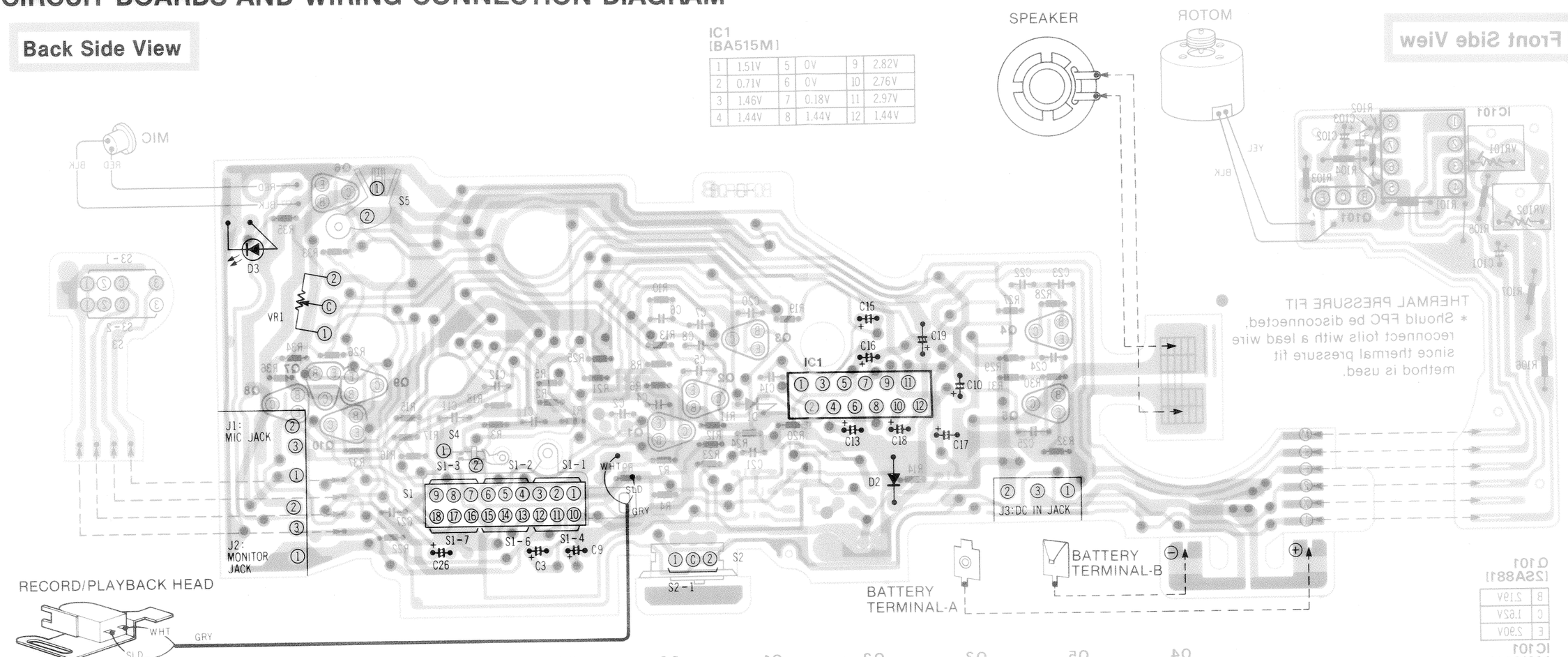
• This circuit board diagram may be modified at any time with the development of new technology.

CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM

Back Side View

IC1 (BA515M)

1	1.51V	5	0V	9	2.82V
2	0.71V	6	0V	10	2.76V
3	1.46V	7	0.18V	11	2.97V
4	1.44V	8	1.44V	12	1.44V



Q8 (DTC143T)

B	0.82V
C	1.70V
E	0.46V

Q7 (2SC2412)

B	0V
C	0.82V
E	—

Q10 (2SC2412)

B	0.17V
C	0.01V
E	0V

Q6 (2SC2412)

B	0.16V
C	0V
E	0V

Q9 (2SC2412)

B	0.82V
C	0.12V
E	0.16V

Q1 (2SC2412)

B	0.58V
C	0.66V
E	0.004V

Q2 (2SC2412)

B	0.60V
C	0.87V
E	0.18V

Q3 (2SC2412)

B	0.18V
C	0V
E	0V

Q5 (2SC2412)

B	0.67V
C	0.82V
E	0.07V

Q4 (2SC2412)

B	0.60V
C	0.74V
E	0V

Front Side View

THERMAL PRESSURE FIT
* Should FPC be disconnected, reconnect foils with a lead wire since thermal pressure fit method is used.

Q101 (2SA881)

B	2.19V
C	1.62V
E	2.90V

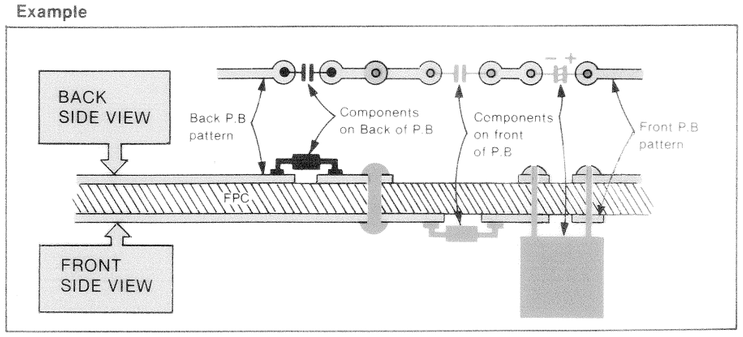
IC101 (AN6616)

1	0.40V	5	0V
2	0.15V	6	2.20V
3	1.15V	7	1.65V
4	2.90V	8	0.48V

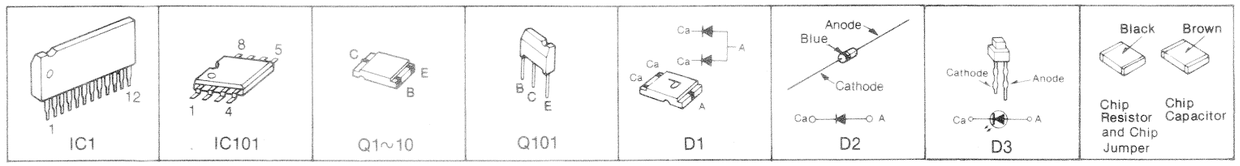
NOTES:

BLK .....Black
BLU .....Blue
BRN.....Brown
GRY.....Gray
GRN ...Green
L. BLU ...Light Blue
NIL .....No Color Mark
ORG ...Orange
PNK.....Pink
RED.....Red
SLD .....Shield Wire
VLT .....Violet
WHT.....White
YEL .....Yellow

Example



TERMINATIONS



NOTES:

- The circuit shown in ▭ on the conductor indicates printed circuit on the back side of the printed circuit board.
- The circuit shown in ▭ on the conductor indicates printed circuit on the front side of the circuit board, which is put the mechanism unit.
- Components on back of P.B are identified by black symbols.
- Components on front of P.B are identified by blue symbols.
- The symbols (◉) shown in the circuit board indicate connection points between conductors on the front side and back side of the circuit board.
- Voltage values shown in ▭ are measured values at the front pattern side of the printed circuit board.
- Voltage values shown in ▭ are measured values at the back pattern side of the printed circuit board.
- Values indicates in ▭ ▭ are DC voltage between the chassis and electrical parts.
- All voltage values shown in circuitry are under no signal condition. Unless otherwise specified, voltage measurement conditions are that tape travel is at PLAYBACK.

• This circuit board diagram may be modified at any time with the development of new technology.

CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM

Front Side View

Back Side View

RECORD\PLAYBACK HEAD

MOTOR

SPEAKER

BATTERY TERMINAL-A

BATTERY TERMINAL-B

MIC

THERMAL PRESSURE FIT
* Should FPC be disconnected, reconnect foils with a lead wire since thermal pressure fit method is used.

IC101 [AN6616]

1	0.40V	5	0V
2	0.15V	6	2.20V
3	1.15V	7	1.65V
4	2.90V	8	0.48V

Q101 [2SA881]

B	2.19V
C	1.62V
E	2.90V

Q4 [2SC2412]

B	0.60V
C	0.74V
E	0V

Q5 [2SC2412]

B	0.67V
C	0.82V
E	0.07V

Q3 [2SC2412]

B	0.18V
C	0V
E	0V

Q2 [2SC2412]

B	0.60V
C	0.87V
E	0.18V

Q1 [2SC2412]

B	0.58V
C	0.66V
E	0.00V

Q9 [2SC2412]

B	0.82V
C	0.17V
E	0.16V

Q6 [2SC2412]

B	0.16V
C	0V
E	0V

Q10 [2SC2412]

B	0.17V
C	0.01V
E	0V

Q7 [2SC2412]

B	0V
C	0.82V
E	—

Q8 [DTC143T]

B	0.82V
C	1.70V
E	0.46V

IC1 [BA6758M]

1	2.5V	8	VDD.1
2	0V	9	VS8.5
3	VLC.0	10	VS6.5
4	VDD.1	11	VS6.5
5	VDD.1	12	VDD.1
6	0V	13	VDD.1
7	VSB.0	14	VDD.1

TERMINATIONS

IC1

IC101

Q5 Q4 Q3 Q2

Q1

D1

D2

D3

Crystal

Anode

Cathode

Blue

Anode

Chip Resistor

Chip Capacitor

Jumper and Chip

Black Brown

NOTES:

- The circuit shown in ▭ on the capacitor indicates printed circuit on the back side of the printed circuit board.
- The circuit shown in ▭ on the capacitor indicates printed circuit on the front side of the circuit board, which is but the mechanism null.
- Components on back of P.B are identified by black examples.
- Components on front of P.B are identified by plane examples.
- The examples (●) shown in the circuit board indicate connection points between conductors on the front side and back side of the circuit board.
- Voltage values shown in ▭ are measured values at the front battery side of the printed circuit board.
- Voltage values shown in ▭ are measured values at the back battery side of the printed circuit board.

NOTES:

- Values indicated in ▭ are DC voltage between the chassis and electrical parts.
- All voltage values shown in circuitry are under no signal condition.
- Unless otherwise specified, voltage measurement conditions are that tape travel is at PLAYBACK.
- **This circuit board diagram may be modified at any time with the development of new technology.**

Example

SIDE VIEW FRONT

SIDE VIEW BACK

Front P.B

Component on front of P.B

Component on Back of P.B

Back P.B

GRY ..... Grey
GRN ..... Green
L.BLU ..... Light Blue
NAT ..... No Color Mark
ORG ..... Orange
PNK ..... Pink
RED ..... Red
SHD ..... Shield Wire
VLT ..... Violet
WHT ..... White
YEL ..... Yellow

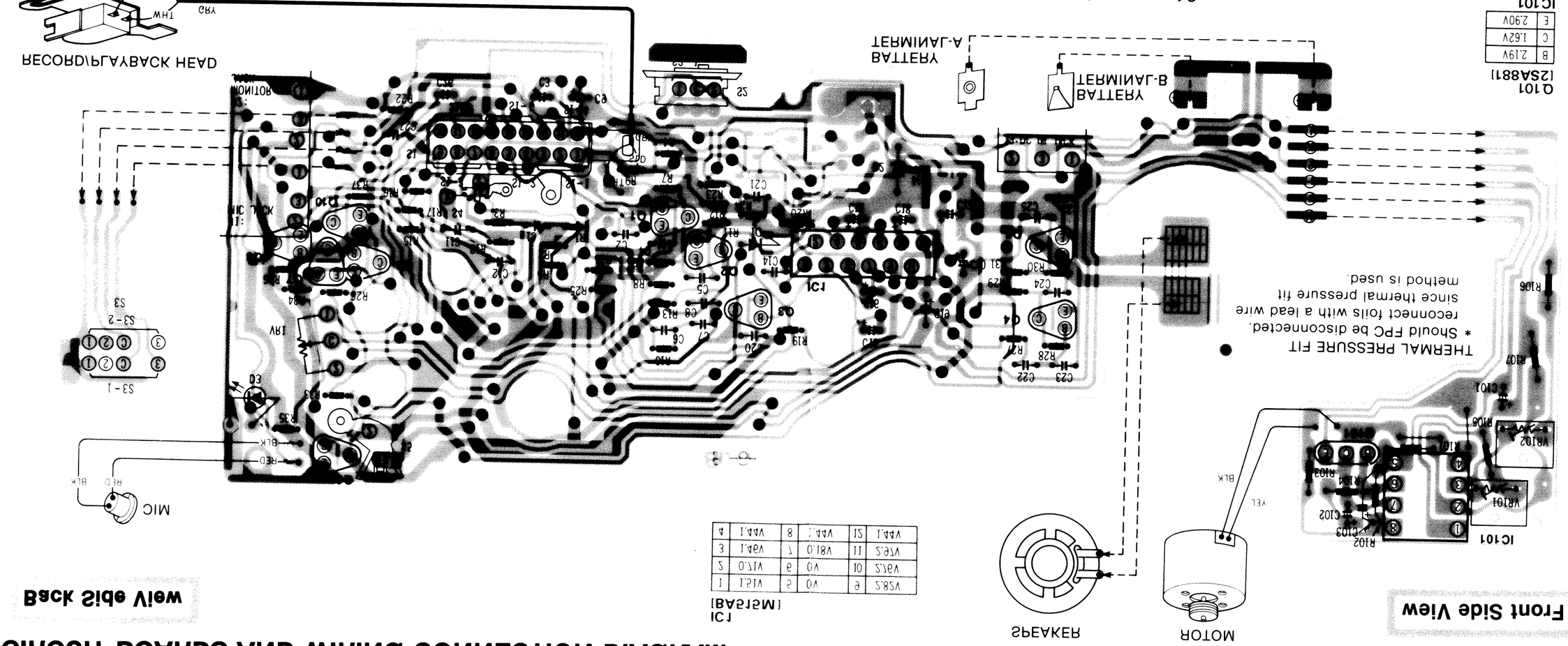
NOTES:

BLK ..... Black
BLU ..... Blue
BRN ..... Brown

CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM

Front Side View

Back Side View



• This circuit board diagram may be modified to fit the type of cassette tape recorder to be used for development. Please modify the final circuit board design.

battery side of the printed circuit board.

- Values indicated in [ ] are DC voltage between the chassis and electrical parts.
- All voltage values shown in circuitry are under no signal condition.
- Unless otherwise specified, voltage measurement conditions are first tape travel is at PLAYBACK.
- Components on front of P.B are identified by plane amperes.
- Components on back of P.B are identified by black amperes.
- The amperes (●) shown in the circuit board indicate connection points between conductors on the front side and back side of the circuit board.
- Voltage values shown in [ ] are measured values at the front battery side of the printed circuit board.
- Voltage values shown in [ ] are measured values at the back side of the printed circuit board.

NOTES:

- The circuit shown in ——— on the conductor indicates printed circuit on the back side of the printed circuit board.
- The circuit shown in ——— on the conductor indicates printed circuit on the front side of the circuit board, which is but the mechanism null.
- Components on back of P.B are identified by black amperes.
- Components on front of P.B are identified by plane amperes.
- The amperes (●) shown in the circuit board indicate connection points between conductors on the front side and back side of the circuit board.
- Voltage values shown in [ ] are measured values at the front battery side of the printed circuit board.
- Voltage values shown in [ ] are measured values at the back side of the printed circuit board.

NOTES:

- The circuit shown in ——— on the conductor indicates printed circuit

TERMINATIONS

IC1	IC101	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q101	CN1	CN2	CN3
													Head Cable and CN1	Capstan Motor and CN2	

IC101 [AN6616]			
1	0.40V	5	0V
2	0.15V	6	2.20V
3	1.15V	7	1.65V
4	2.90V	8	0.48V

Q101 [2SA881]	
B	2.19V
C	1.62V
E	2.90V

Q4 [2SC2412]	
B	0.60V
C	0.74V
E	0V

Q5 [2SC2412]	
B	0.67V
C	0.82V
E	0.07V

Q3 [2SC2412]	
B	0.18V
C	0V
E	0V

Q2 [2SC2412]	
B	0.60V
C	0.87V
E	0.18V

Q1 [2SC2412]	
B	0.58V
C	0.66V
E	0.00V

Q9 [2SC2412]	
B	0.82V
C	0.17V
E	0.16V

Q6 [2SC2412]	
B	0.16V
C	0V
E	0V

Q10 [2SC2412]	
B	0.17V
C	0.01V
E	0V

Q7 [2SC2412]	
B	0V
C	0.82V
E	—

Q8 [DTC143T]	
B	0.82V
C	1.70V
E	0.46V

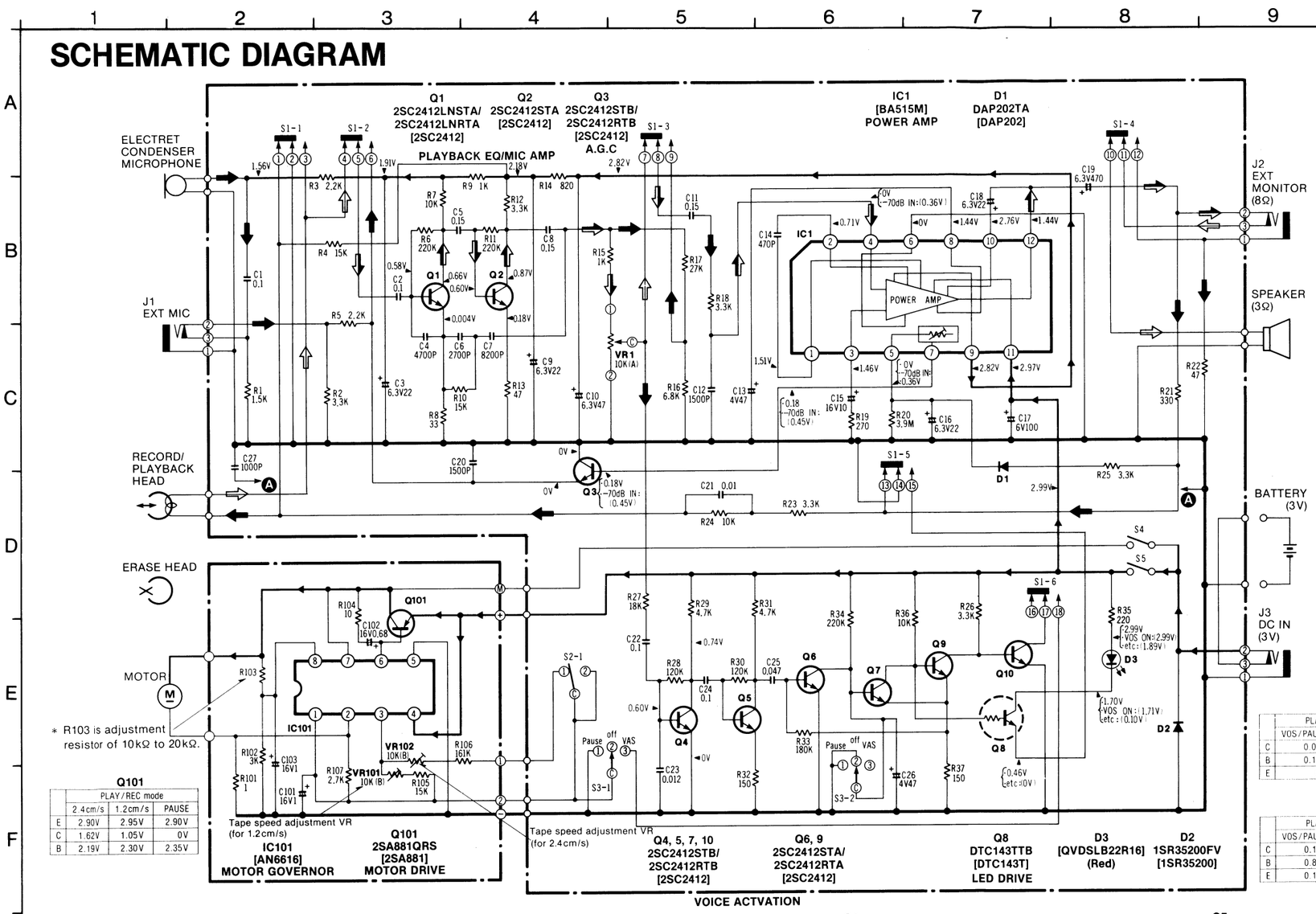
IC1 [BA6758M]					
1	VTS.I	2	VO	9	VSS.S
2	VTS.O	3	VO	10	VBT.S
3	VTC.O	4	VO	11	VTC.S
4	VBA.I	5	VBA.C	12	VBA.I

Example

NOTES:

BLK ..... Black
BLU ..... Blue
BRN ..... Brown
GRY ..... Grey
GRN ..... Green
L.BLU ... Light Blue
NIL ..... No Color Mark
ORG ... Orange
PNK ..... Pink
RED ..... Red
SLD ..... Shield Wire
VLT ..... Violet
WHT ..... White
YEL ..... Yellow

SCHEMATIC DIAGRAM



Q101

	PLAY / REC mode		
	2.4cm/s	1.2cm/s	PAUSE
E	2.90V	2.95V	2.90V
C	1.62V	1.05V	0V
B	2.19V	2.30V	2.35V

IC101

	2.4cm/s		1.2cm/s		PAUSE
	PLAY	F.F/REW	PLAY	F.F/REW	
1	0.40V	0.32V	0.30V	0.21V	0.05V
2	0.15V	0.06V	0.15V	0.06V	0.05V
3	1.15V	1.04V	1.15V	1.04V	1.03V
4	2.90V	2.97V	2.90V	2.97V	2.90V
5	0V	0V	0V	0V	0.05V
6	2.20V	2.56V	2.20V	2.56V	2.35V
7	1.65V	2.97V	1.06V	2.97V	0.05V
8	0.48V	0.60V	0.25V	0.60V	0.05V

Q5

	PLAY	REC (No signal)		REC (−72dB IN)	
	VOS/PAUSE: OFF	VOS/PAUSE: OFF	VOS: ON	VOS/PAUSE: OFF	VOS: ON
C	0.82V	0.82V	0.82V	1.31V	1.31V
B	0.67V	0.67V	0.67V	0.63V	0.63V
E	0.07V	0.07V	0.07V	0.05V	0.05V

Q6

	PLAY	REC (No signal)		REC (−72dB IN)	
	VOS/PAUSE: OFF	VOS/PAUSE: OFF	VOS: ON	VOS/PAUSE: OFF	VOS: ON
C	0V	0V	0.64V	0V	0.02V
B	0.16V	0.16V	0.05V	—	—
E	0V	0V	0V	0V	0V

Q7

	PLAY	REC (No signal)		REC (−72dB IN)	
	VOS/PAUSE: OFF	VOS/PAUSE: OFF	VOS: ON	VOS/PAUSE: OFF	VOS: ON
C	0.82V	0.82V	0.10V	0.81V	0.81V
B	0V	0V	0.64V	0V	0.02V
E	0.16V	0.61V	0.05V	0.15V	0.15V

Q10

	PLAY	REC (No signal)		REC (−72dB IN)	
	VOS/PAUSE: OFF	VOS/PAUSE: OFF	VOS: ON	VOS/PAUSE: OFF	VOS: ON
C	0.01V	0.01V	0.01V	0.22V	0.22V
B	0.17V	0.17V	0.69V	0.17V	0.17V
E	0V	0V	0V	0V	0V

Q9

	PLAY	REC (No signal)		REC (−72dB IN)	
	VOS/PAUSE: OFF	VOS/PAUSE: OFF	VOS: ON	VOS/PAUSE: OFF	VOS: ON
C	0.17V	0.17V	0.69V	0.17V	0.17V
B	0.82V	0.82V	0.10V	0.81V	0.81V
E	0.16V	0.16V	0.05V	0.15V	0.15V

NOTES:

- S1-1—S1-6 .....Record/Playback switch (shown in playback position).
- S2-1 .....Tape speed selector (shown in 2.4cm/s position). [1...2.4cm/s, 2...1.2cm/s]
- S3-1, S3-2.....Pause/VAS ON/OFF switch (shown in OFF position). [1...Pause, 2...OFF, 3...VAS]
- S4.....Fast forward/Rewind switch (shown in OFF position).
- S5.....Playback switch (shown in OFF position).
- VR1 .....Volume control.
- VR101 .....Tape speed adjustment VR (for 1.2cm/s).
- VR102 .....Tape speed adjustment VR (for 2.4cm/s).
- Resistance are in ohms (Ω), 1/8 watt unless specified otherwise. 1K = 1,000Ω, 1M = 1,000KΩ.
- Capacity are in microfarads (μF) unless specified otherwise. P = Pico-farads.

- All voltage values shwon in circuitry are under no signal condition and playback mode with volume control at maximum position otherwise specified. However, the voltage in record mode is indicated in ( ) when it differs from the in playback mode.
  - FF/REW .....Voltage values at fast forward/rewind mode.
  - PAUSE .....Voltage values at pause mode.
  - VOS ON .....Voltage values at which the VAS switch is tured on.
  - −72dB IN.....Voltage values at recording mode (input signal level: −72dB/1kHz).
  - 2.4cm/s .....Voltage values at 2.4cm/s (Tape speed select switch) mode.
  - 1.2cm/s .....Voltage values at 1.2cm/s (Tape speed select switch) mode.

  For measurement, use VTVM.

- (⇨) this arrow indicates the flow of the playback signal.
- (➡) this arrow indicates the flow of the recording signal.
- (⇨) this arrow indicates the flow of the playback and recording signal in combination.
- (⟵) this arrow indicates the flow of the B+ (bias).
- Described in the schematic diagram are two types of numbers; the supply part number and production parts number for transistors and diodes. One type of number is used for supply parts number and production parts number when they are identical.

SPECIFICATION * Volume control...MAX.

Standard recording input level	MIC: around −72dB

ELECTRICAL PARTS LIST

NOTES: RESISTORS
- ERD.....Carbon
- ERG .....Metal-oxide
- ERS.....Metal-oxide
- ERO .....Metal-film
- ERX.....Metal-film
- ERQ .....Fuse type metallic
- ERC.....Solid
- ERF.....Cement

CHIP RESISTORS
- RRD .....Carbon

CHIP CAPACITORS
- QCU□.....Ceramic

CAPACITORS
- ECBA .....Ceramic
- ECG□.....Ceramic
- ECK□ .....Ceramic
- ECC□ .....Ceramic
- ECF□ .....Ceramic
- ECQM.....Polyester film
- ECQE .....Polyester film
- ECQF .....Polypropylene
- ECE□ .....Electrolytic
- ECE□N ...Non polar electrolytic
- ECQS .....Polystyrene
- ECS□ .....Tantalum
- QCS .....Tantalum

REPLACEMENT PARTS LIST

Ref. No.	Part No.	Ref. No.	Part No.	Ref. No.	Part No.
RESISTORS		R 29	RRD10XJ472	C 5	QCUX1E154ZFX
		R 30	RRD10XJ124	C 6	QCUT1H272MRL
R 1	RRD10XJ152	R 31	RRD10XJ472	C 7	QCUT1H822KRL
R 2	RRD10XJ332			C 8	QCUX1E154ZFX
R 3	RRD10XJ222	R 32	RRD10XJ151	C 9	ECEA0JK220
R 4	RRD10XJ153	R 33	RRD10XJ184	C 10	ECEA0JK470
R 5	RRD10XJ222	R 34	RRD10XJ224	C 11	QCUX1E154ZFX
R 6	RRD10XJ224	R 35	RRD10XJ221		
R 7	RRD10XJ103	R 36	RRD10XJ103	C 12	QCUT1H152MRL
R 8	RRD10XJ330	R 37	RRD10XJ151	C 13	ECEA0GK470
R 9	RRD10XJ102	R 101	ERSA39T1R0	C 14	QCUT1H471MRL
R 10	RRD10XJ153	R 102	ERD10TJ302	C 15	ECEA1CK100
		R 103		C 16	ECEA0JK220
R 11	RRD10XJ224	Selectable Resistor: 10kΩ ~ 20kΩ		C 17	ECEA0JK101
R 12	RRD10XJ332	[Center Value: 16kΩ (ERD10TJ163)]		C 18	ECEA0JK220
R 13	RRD10XJ470	R 104	ERD10TJ100	C 19	ECEA0JU471
R 14	RRD10XJ821			C 20	QCUT1H152MRL
R 15	RRD10XJ102	R 105	ERD10TJ163	C 21	QCUT1H103MRL
R 16	RRD10XJ682	R 106	ERD10TJ183		
R 17	RRD10XJ273	R 107	ERD10TJ272	C 22	QCUT1E104ZFL
R 18	RRD10XJ332			C 23	QCUT1H123MRL
R 19	RRD10XJ271	**VARIABLE RESISTORS**		C 24	QCUT1E104ZFL
R 20	RRD18XK395			C 25	QCUX1E473ZFX
		VR 1	EVLCPAA00A14	C 26	ECEA0GK470
R 21	RRD10XJ331	VR 101, 102	EVNA6AA00B14	C 27	QCUT1H102MRL
R 22	RRD10XJ470	**CAPACITORS**		C 101	ECSF1CE105
R 23	RRD10XJ332			C 102	ECSF1CM684
R 24	RRD10XJ103	C 1, 2	QCUT1E104ZFL		
R 25, 26	RRD10XJ332	C 3	ECEA0JK220	**TRANSISTORS**	
R 27	RRD10XJ183	C 4	QCUT1H472MRL		
R 28	RRD10XJ124			Q 1, 2, 3, 4, 5, 6, 7	2SC2412
				Q 8	DTC143T
				Q 9, 10	2SC2412
				Q 101	2SA881

DIODES & RECTIFIERS

D 1	DAP202
D 2	1SR35200
D 3	QVDSLB22R16

INTEGRATED CIRCUITS

IC 1	BA515M
IC 101	AN6616

Ref. No.	Part No.	Part Name & Description
SWITCHES		
S 1	QSS6221	Slide Switch (Record/ Playback Selector)
S 2	QSS2230	Slide Switch (Tape Speed Selector)
S 3	QSS2302	Slide Switch (VAS/Pause Selector)
S 4	QSB0250	Leaf Switch (FF/Rewind)
S 5	QSB0276	Leaf Switch (Playback)
JACKS		
J 1, 2	QJA0450	M2 Jack (MIC/Monitor)
J 3	QJA0181	DC IN Jack

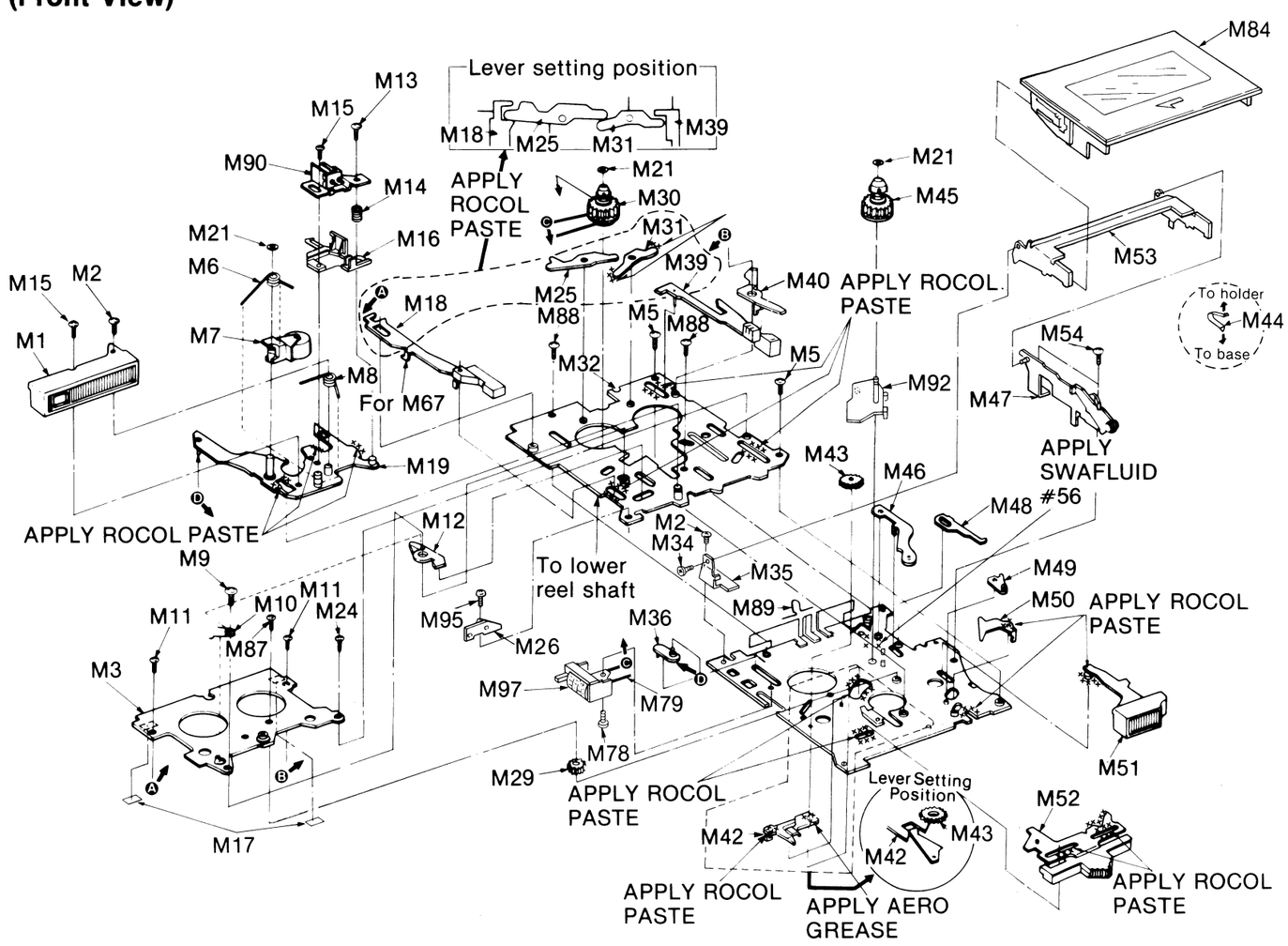
e.g. **Q1**
2SC2021LNFS——Production parts number
or 2SD636HS
[2SD636]————Supply parts number
D1
OA90SMTA——Production parts number
[OA90]————Supply parts number

- **The supply parts number is described alone in the replacement parts list.**

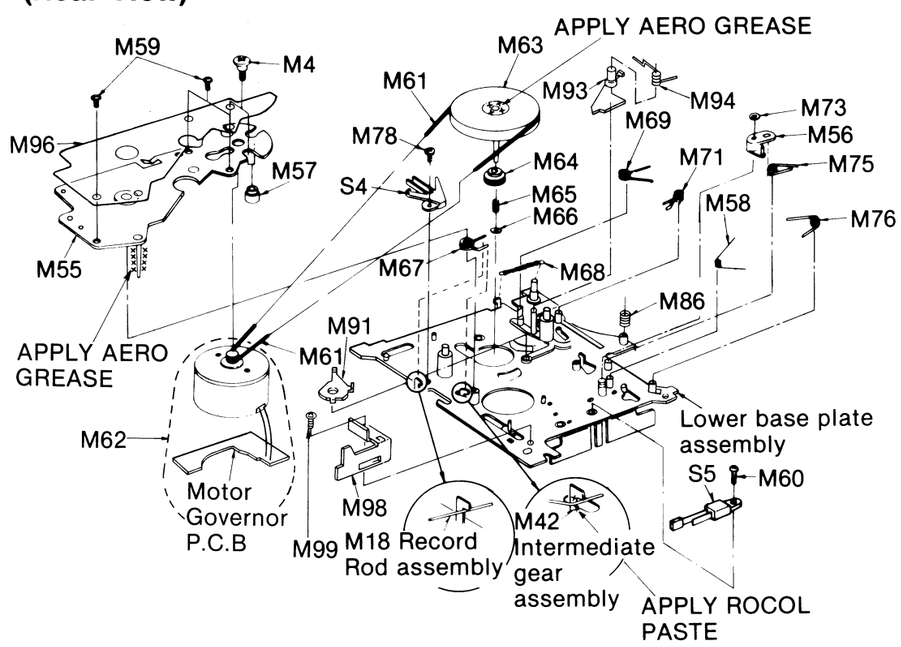
- **This schematic diagram may be modified at any time with the development of new technology.**

MECHANISM PARTS LOCATION

(Front View)



(Rear View)



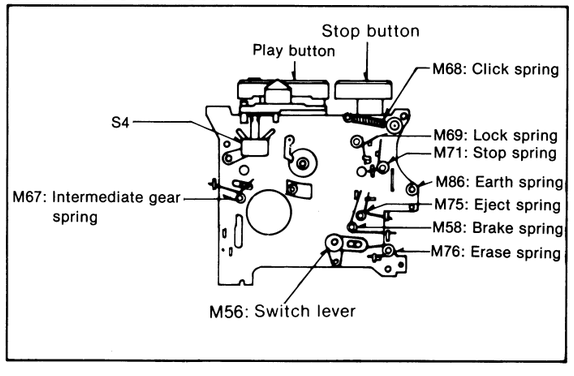
NOTES:

- When changing mechanism parts, apply the specified grease to the area marked "xx" shown in the drawing "Mechanical Parts Location".

SPECIFICATIONS

ITEM	VALUE	REMARKS
Wow and flutter (JIS)	RMS; At 2.4cm/s; Less than 0.6% At 1.2cm/s; Less than 1.2%	Use 3kHz test tape (QZZMWA; for 2.4cm/s) (QZZMWBL; for 1.2cm/s)
Pressure of pinch roller	200±25g	

SPRING LOCATION



REPLACEMENT PARTS LIST

Ref. No.	Part No.	Part Name & Description
		MECHANICAL PARTS
M 1	QG01782	Playback Button
M 2	XTNQ16A2M	Tapping Screw ⊕1.6×2
M 3	QXK2877	Reflection Plate Assembly
M 4	QHQ1360	Step Screw
M 5	XQN16+C35FZ	Screw ⊕1.6×3.5
M 6	QBN1632	Pinch Roller Spring
M 7	QXL1437	Pinch Roller Arm Assembly
M 8	QBN1628	Playback Spring
M 9	QHQ1254	Step Screw
M 10	QBN1738	Record Lock Spring
M 11	XQS14+A14FC	Screw ⊕1.4×1.4
M 12	QML3874	Record Lock Lever
M 13	QHQ1366	Head Adjustment Screw
M 14	QBC1331	Head Spring
M 15	XTNQ16A22M	Tapping Screw ⊕1.6×2.2
M 16	QMG0130	Tape Guide
M 17	XTW1380	Spacer
M 18	QXR1003	Record Button Assembly
M 19	QXK2257	Head Base Plate Assembly
M 21	QBW2081	Poly Washer
M 24	XQN16+A16FN	Screw ⊕1.6×1.6
M 25	QML4109	Reversing Lever-A
M 26	QMA4395	Mechanism Hold Angle-A
M 29	QDG1156	Rewind Gear
M 30	QXD0151	Takeup Reel Table Assembly
M 31	QML4110	Reversing Lever-B
M 32	QXK2252	Upper Base Plate Assembly
M 34	QHQ1308	Step Screw
M 35	QMA3886	Holder Angle
M 36	QMF2143	Switch Lever-A
M 39	QXR0966	Erase Rod Assembly
M 40	QML3400	Record Detection Lever
M 42	QMF2242	Intermediate Gear Plate
M 43	QDG1237	Intermediate Gear
M 44	QBP1878	Plate Spring-B
M 45	QXD0162	Supply Reel Table Assembly
M 46	QML3875	Brake Arm Assembly
M 47	QXA1257	Eject Angle Assembly
M 48	QMF1998	Eject Plate
M 49	QXL1236	Lock Lever Assembly
M 50	QMF2347	Click Plate
M 51	QXR0744	Stop/Eject Button Assembly
M 52	QXH0455	Fast Wind Plate Assembly
M 53	QXA1235	Lid Holder Assembly
M 54	XTNQ16C2M	Screw ⊕1.6×2
M 55	QXK2876	Motor Holding Plate Assembly
M 56	QML3647	Switch Lever-B
M 57	QBG1768	Motor Cushion
M 58	QBN1633	Brake Spring
M 59	XQS16+A4FZ	Screw ⊕1.6×4
M 60	XTNQ16C5M	Screw ⊕1.6×5
M 61	QDB0272	Flywheel Belt
M 62	MXDE3B3LWA	Motor (with Motor Governor P.C.B.)
M 63	QXF0162	Flywheel Assembly
M 64	QDG1204	Flywheel Gear
M 65	QBC1354	Flywheel Spring
M 66	QBW2060	Poly Washer
M 67	QBN1737	Intermediate Gear Spring
M 68	QBT1855	Click Spring
M 69	QBN2070	Lock Spring
M 71	QBN1631	Stop Spring
M 73	QBW2007	Snap Washer
M 75	QBN1627	Eject Spring
M 76	QBN1736	Erase Spring
M 78	XTNQ16C28F	Screw ⊕1.6×2.8
M 79	QDB0293	Counter Belt
M 84	QYF0536S4	Cassette Lid Assembly
M 86	QBC1411	Earth Spring
M 87	XTNQ14A39FFZ	Screw ⊕1.4×3.9
M 88	XTNQ16A25	Screw ⊕1.6×2.5
M 89	QBN1892	Cassette Retainer Spring
M 90	QWY0136Y	Record/Playback Head
M 91	QML4133	Driving Lever
M 92	QML4134	Reel Table Lever
M 93	QML4132	Lock Release Lever
M 94	QBN2071	Lock Release Lever Spring
M 95	XTNQ16C3M	Screw ⊕1.6×3
M 96	QTW1376	Insulator Sheet
M 97	QXC0077	Counter Assembly
M 98	QMA4374	Mechanism Hold Angle-B
M 99	XTNQ16C22FFZ	Tapping Screw ⊕1.6×22

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